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Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various scientific articles and their page numbers, including Alloy, fusible (25), Animals, killing (28), Answers to correspondents, and many others.

A WANT.

Many ingenious experiments have been made to determine how long, on the average, it takes a man to receive a mental impression and respond to it by some simple action.

A series of corresponding investigations of the rate at which the human mind acts in bulk is also very much needed. In them it would be not the mental action of individuals, but of classes, that would be studied.

The investigation would have to be made historically, by such a man as Francis Galton or Herbert Spencer, assisted by specialists in the several departments of human progress, who would compile tables of the great discoveries in their special fields, setting opposite to each discovery of important fact or principle the time required for the several stages of its progress to general acceptance.

That such a scheme could not at once be carried out, with any degree of perfection or completeness, is no argument against it. It is true that only a very few scientific and other discoveries have yet permeated all classes; nevertheless the very gaps in the tables would be instructive, as evidences of the hollowness of the pretended culture of

many respectable classes, and the impenetrability of other classes to large congeries of truths. Even approximate tables would be immensely valuable; they would save such a world of anxiety!

For example, a man makes, after years of patient study, an important discovery—say in optics. He hastens to lay his achievement before the world, and naturally expects that the world will be as glad to receive as he is to publish the new truth. But somehow the world does not see it. Most likely, if the discovery be of prime importance, it will be disputed with the intensest vigor by the very men who ought to welcome it.

Possibly there are men, like Dr. Draper, who have learned from long experience—at least in their special departments—pretty much all that such tables would teach them; but for younger men and men of more hasty temperaments, they would be exceedingly useful. And they would be not without their uses to other than discoverers.

A vital truth is added to the world's too limited stock, changing, perhaps, the entire aspect of a science. He takes pains to have it promptly and explicitly set before his readers. He knows that the attention of A, B, and C is repeatedly called to the truth and its bearings; yet year after year he will see them serenely teaching the old, it may be exploded, theory, as the last addition to men's knowledge in that department: A, B, C, and the rest of the alphabet standing for classes of honest and supposedly intelligent humanity, requiring respectively one, five, ten, fifty years, or more to learn anything.

Personally, we often feel the need of just such specific knowledge of the varying rates of speed at which intelligence becomes incorporated in the mental furnishing of various classes of men. Then, when we should see some scientific doctrine atrociously misstated by some "leader" in literature, metaphysics, or theology, the knowledge that it requires on the average so many years, or so many generations, for a clear conception of any new scientific thought to penetrate that particular body of men, would reconcile us to its slow illumination in that particular instance.

We should not be surprised even to learn that a sensation was caused in certain circles by the bold assertion that the world is not flat; or to hear that a like effect was produced in theological circles where one of the most liberal and talented men of the English church plucks up courage to say, as Dean Stanley did the other day, in a sermon on the death of Lyall, that "it is now known that the vast epochs demanded by scientific observation are incompatible with the 6,000 years of the Mosaic chronology, and the six days of the Mosaic creation," implying that geology is right and Genesis wrong.

"There are three spectra," says the writer: who quotes Dr. Draper as an authority in solar matters, but has not yet heard of his most important discoveries: "there are three spectra, one of which, the thermal, takes action upon all kinds of matter; another of which, the luminous, acts only upon a certain special form of nerve matter; while a third, the chemical, produces changes in certain compounds;" and the usual figure is given, showing "the Intensities of the Forces of the Spectrum."

It would be a comfort to know just how long we can reasonably expect such popularizers of Science to continue in ignorance of what Dr. Draper has done to demonstrate the utter absence of any such triple division of the sunbeam; how long it will probably take them to discover that red light is as capable of producing chemical effect as violet light, and that in all probability the yellow rays seem most luminous simply because they act most energetically upon carbon compounds, such as compose the retina; but in the absence of the investigation we have suggested, such consolation is denied us. And there are such a multitude of similar cases!

A PRACTICAL CURE FOR VAGRANCY.

When Count Rumford became the friend of the King and virtual ruler of Bavaria, he found the country swarming with beggars. In the large towns, beggary was an organized imposture, insolent, clamorous, persistent. The rural districts were overrun with tramps of all ages and every na-

tionality, who levied contributions, robbed, and tyrannized everywhere: and not only their impudence and clamorous importunity were boundless, to use the Count's own words, but they had recourse to the most diabolical arts and the most horrible crimes in the prosecution of their infamous trade. All the regular machinery for the repression of vagrancy was unavailing. The people were diheartened. Industry was well nigh paralyzed by the parasitic multitude, and the honest peasantry had become so corrupted by bad example that they would leave their work in the fields to beg of travelers on the highway. Beggary had become so common and customary that it no longer seemed shameful or infamous.

Yet the whole system fell in a day when attacked by the Count's resolute will and sterling sense. His remedy was work, fairly rewarded, so presented as to make industry as attractive as possible, but rigorously insisted on. His plans for housing, feeding, and employing the beggar class were quietly perfected; then, on the first day of January, 1790, every beggar was arrested and set to work.

The law was: No idleness, no begging, no dirt or debauchery; but work for all, good food, kind treatment, and instruction in the ways of honest living. In one day the plague of beggary was stopped. And it was not long before the majority learned to prefer the comfort, decency, and respectability of honest industry to their former squalor, idleness, debauchery, and crime. And the experiment paid financially.

Count Rumford's report of the experiment, written after it had been five years in operation, shows that it had not only banished beggary and effected an entire change in the manners, habits, and appearance of the class which had been so abandoned and degraded, but that it had made them self-supporting. The saving effected in cutting off a great source of crime was beyond estimation.

In every part of the Eastern and Middle States, especially within walking distance of our chief cities, an order of things is growing up the precise counterpart of that which the Count found in Bavaria. The tramp is everywhere—male, female, limp, lazy, insolent. Every country road swarms with them, and the country people begin to look upon them as an inevitable infliction, less dangerous when fed and sheltered than when hungry and at large. Refuse them food, and your hen roost pays the penalty. Deny them a bed in the barn, and they set it on fire. They travel in gangs and disperse to forage, levying contributions right and left. Their vagrant life suits them; and miserable as they seem to be, no proffer of honest wages for honest work will induce them to leave the road. Every season their number increases, and competition only increases their audacity. Unless the evil is differently dealt with, it will soon become as intolerable as it was in Bavaria.

No method of treatment involving large preliminary outlay for workshops, concert of action, or central authority can be looked for here; we need not one but ten thousand Rumfords. Every town must apply its own remedies: nevertheless it would not be hard to devise a plan by which the whole system of tramping could be as quickly broken up as it was in Bavaria, and that without taking the tramps from the roads they love so dearly.

Any town can inaugurate the plan by enacting and enforcing a regulation to this effect: Fix the penalty for begging—that is, professional begging—at ten days' labor on the highways for each offense; there is no danger of a falling demand for that sort of labor for the next fifty years. Give to every citizen the power to make arrests in cases of vagrancy; and for every ten days' labor by the party so arrested, credit the person making the arrest with five days toward the working out of his road tax. For his labor, give the tramp decent board and lodging, and from ten to fifty cents a day as wages, according to his efficiency. Let such a law be rigorously executed, and in a little while we should have better roads and fewer tramps.

The honest seekers for work would suffer less under such a system than they do now, when they are apt to be confounded with professional beggars, who are always in search of a job—somewhere else. If seriously in need of work and money, the temporary tramp would simply have to apply to the road master, who would never be without employment to give and fifty cents a day to pay for it. The work hunter would not be long in acquiring enough to pay his way further or to support himself until he found work in the neighborhood. Farmers and others in want of help would soon learn to resort to the road gangs to pick their men, the volunteers being free to engage themselves at any time, those under arrest when their ten days were up. The professionals would more or less quickly learn to prefer free labor at high rates to enforced work on the roads at low rates; in the meantime an enormous "waste product" would be utilized, and the highways improved at small cost to the residents. It is safe to predict that any community adopting such a plan would soon have better roads or fewer beggars—possibly both.

THE WRECK OF THE SCHILLER.

A terrible marine disaster occurred on May 7, off the Scilly Islands, near the English coast. The Schiller, a new and magnificent steamship belonging to the Eagle line, was entirely wrecked. The ship was on her voyage from New York to Hamburg, and was endeavoring to reach Plymouth, England, in the midst of a thick fog, which, for three days, had prevented observations. The captain probably mistook his position, and at ten o'clock at night the vessel struck on Retarrière reef, while under almost full steam headway. A strong gale and heavy sea speedily caused her to drift broadside on the rocks, the waves sweeping her decks, and finally, as the tide rose, carrying away her masts, which were loaded

with passengers who had ascended the rigging for safety. But two of the boats reached shore; and out of three hundred and eighty-five people on board, but forty-three were saved. Ordinary life preservers, it appears, were on board; and after the shock, every woman was secured in one. It is curious to note, however, that, despite this precaution, all, with one exception, were drowned.

It is impossible to suggest any means of safety which could be provided, which would preserve life under such circumstances as these, in the midst of a raging sea; but we are not without hope that some inventor will yet devise a life preserver capable of meeting all emergencies. The apparatus must be such as to support the person entirely independently of his own exertions; it must prevent his becoming drowned by constant submersions by the waves breaking over his head; it must be capable of easy application, and be as self-adjusting as an old coat. There must be but one way of getting into it, and that perfectly obvious under extreme excitement; and to sum up all, it must possess the element of simplicity to such a degree that a thoroughly frightened woman cannot by any possibility mistake what it is for, and what to do with it.

The Schiller had eight boats, and seven watertight compartments. Her length was 375 feet, beam, 40 feet, and tonnage, 3,000. Her engines were of 3,000 indicated horse power. She made her first trip in February, 1874. Her cost was \$800,000, gold.

A SUCCESS FOR THE FISHERY COMMISSION.

"Never see'd nuthin like it, Sir; I've been a settin' nets on this 'ere river for more'n ten year, and there aint been no time when North River shad was as many as they are now. They're as plentiful as porgies, and we can't get nothin for 'em. Why we used to get our two dollars or a dollar an' a half a piece for them in the early spring; but now—why there's an old woman a sellin' 'em out of a keg for twenty-five cents a pair. It's ruinous, this is: them fishery fellers have just busted the business; I might jes' as well sell the nets, and take ter mackrel fishin'." Thus remarked a Washington market fish dealer to us the other day, after we had requested his opinion on the sudden increase in the shad catch, which over 30,000 fish taken already this spring denoted. "Them fishery fellers," in other words the State Fishery Commission, had stocked the river anew, broken up the fish famine, and filled the Hudson with finer and better shad than have been seen in it for years. The use of nets extending clear across the stream, which now, we believe, is forbidden by law, had resulted in practical depopulation; for the fish were completely barr'd out of the head waters where they were wont to spawn. Gradually they diminished until North River shad became a dainty far beyond the reach of the average pocket.

Three or four years ago, Science, under the guise of Mr. Seth Green and his assistants, set to work to make up the deficiency. Five million young fish were placed in the Hudson and its tributaries, and the result we are now gathering. This is a grand success for the pisciculturists, and the people will appreciate it. We trust that it is but the precursor of other palpable proofs of the possibility of enlarging our supply of finny food; for an increased popular interest, which will thus be engendered, is sure to be followed by substantial contributions through which the labors of the fish culturists can be aided and their value further augmented.

DESIGN PATENTS AND TRADE MARKS.

The importance, to manufacturers, merchants, and others, of securing protection for the use of emblems, vignettes, or names on their goods, whether of domestic manufacture or imported, does not seem to be sufficiently appreciated. Trade marks are granted to any person or firm domiciled in the United States, or any firm or corporation residing in any foreign country where similar privileges are extended to citizens of the United States, and extend for 30 years. A great many agents of foreign manufacturers, residing in our large cities, have availed themselves of the simple provision of our law by securing trade marks on imported goods. But our own manufacturers do not seem to be alive to the importance of availing themselves of that protection, afforded under our patent laws.

The "centennial" year is approaching, and we should think that any manufacturer would do well to secure a trade mark on the word as applied to a great variety of articles, such as hats, caps, collars, shirts, shoes, knives, inkstands, stoves, ranges, etc.

The above remarks apply with equal force to all persons who neglect to take patents on any new and original designs for busts, statues, stove plates, picture frames, crockery, cutlery, stoves, or any other ornamental articles. Patents are also granted on any new and original design for the printing of woolen, silk, cotton, or other fabrics, any new and original impression, ornament, pattern, print, or picture, to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture. Design patents afford protection for different periods (three and a half, seven, or fourteen years) as the party applying may elect, and the cost varies accordingly.

For information on the securing of trade marks and design patents, address the publishers of this paper, who will be pleased to impart, free of charge, all necessary advice.

THE NEW INTERNATIONAL POSTAL RATES.

On and after July 1, uniform postal rates will be collected on mail matter sent between the United States and Germany, Austria, Hungary, Belgium, Denmark, Egypt, Spain, Great

Britain, Greece, Italy, Luxemburgh, Norway, Holland, Portugal, Roumania, Russia, Servia, Sweden, Switzerland, and Turkey. After January 1, 1876, France is also to be included in the union.

These new rates have been established by treaty between the different powers, and offer in some cases great reductions on the charges now existing, while in others the tariff is increased. To all the above countries, the tax for letters, paid or unpaid, per half ounce, is ten cents; postal cards, two cents each; newspapers under four ounces, two cents; other printed matter, samples, etc., two cents per two ounces or fraction. The registration fee on any letter is fixed at eight cents. For letters, these rates are less than the present to Spain, Egypt, Greece, Portugal, Russia, and Turkey; to other countries, with the exception of Italy, Norway, Holland, and Roumania, they are increased. The newspaper postage is largely reduced in every case, excepting in that of Great Britain, to which country it remains practically the same. The postal card rate is an innovation, and the fact that a missive may soon be sent from San Francisco to Constantinople for two cents is certainly a remarkable indication of progress.

The public will be greatly the gainers in thus having a fixed and reduced rate of postage, to nearly all the civilized countries, substituted for the numerous and different charges now in existence.

SUCCESSFUL TRANSPLANTATION OF BONE.

Speaking of surgical operations in a late issue, we said that attempts had been made to substitute healthy for diseased bones by a sort of grafting process, but they had fallen short of complete success.

A peculiarly interesting, because completely successful, operation of the sort is reported in a recent German medical journal. The patient was a young officer, twenty-four years of age. In 1870, he received a gunshot wound which resulted in a false joint in the middle of the right ulna—the large bone of the fore arm. The functions of the limb were seriously impaired, notwithstanding the smaller bone, the radius, was uninjured. To relieve the deformity, the false joint was laid bare, and the cartilaginous ends of the bone, together with the false ligament, were removed by strong scissors. Then the upper part of the ulna was sawn half through, about two inches above the end of the bone, and the upper piece, with its enclosing sheath—the periosteum, by which the nutrition of the bone is effected—was split off with a hammer and chisel, leaving, however, a small bridge of the periosteum to keep the bone alive. The detached bone was neatly fitted into the place of the false joint; the fatty and indurated soft parts were divided so as to set up an inflammatory reaction; the bleeding was checked by a stream of carbolyzed water, the wound closed by sutures, and a fenestrated plaster of Paris bandage applied. A single splinter of dead bone subsequently came away. The patient made a perfect recovery, regaining such full use of his arm that he was appointed to a regiment.

OUR NATIONAL UNIVERSITY OF TECHNOLOGY.

The late Hon. J. C. Osgood, to whom we owe the canal dredge and other useful inventions, became an inventor, it is said, through his lively sense of the ridiculous. He was in an upholstering establishment one day, where he saw a number of people at work picking and curling horsehair. The systematic waste of time and labor involved in the operation seemed to him so ridiculously absurd that he laughed heartily, rushed out of the shop, and—so the story runs— invented a picking and curling machine which "produced a revolution in that branch of industry." Having tasted the sweets of invention, he went on to more serious achievements.

Volumes of similar incidents might be compiled from the experience of inventors in this country. There is scarcely an industry which has not been more than once revolutionized by means of labor-saving inventions: scarcely an inventor whose inventive genius has not been awakened by some seemingly trifling circumstance, some happy thought, and afterwards developed by creative exercise.

The rationale of such occurrences is worth inquiring into. Why do such things happen so frequently here, so seldom in other countries?

It was a Frenchman who said it was to be expected that a Yankee would be sharp at a bargain. It was dinned into his ears from earliest infancy; the burden of his mother's lullaby was: "Buy low, baby!" Still more, according to the facetious Englishman, is it to be expected that a Yankee will invent. It is born in him. While the baby lies in his cradle he invents an improvement on it, and says to himself: "When I'm a little bigger, I'll take out a patent!"

Seriously, there is more in the idea than the Englishman gave himself credit for. The great incentive to invention—an incentive which has made us a nation of inventors—is the possibility of taking out a patent easily and cheaply. Every American knows that, for an almost nominal sum—which might be further reduced to the country's advantage—the Patent Office will give him a certificate of exclusive proprietorship in any new idea he may develop, and that the courts will protect him in making as much money out of it as he can during the term of seventeen years. He knows that there is no more profitable investment for capital than a good patent; no way by which a man without capital can command capital so surely as by a good invention; no property more productive than a good patent; no way by which brains will bring to the possessor a greater portion of this world's goods than through invention; no means of self-culture so effective or so sure to have its good results so promptly re-

cognized by the world. Consequently the country swarms with inventors, each doing his best to make life easier and richer to every inhabitant of the land. The inducements which the government holds out to men of ideas have thus made the Patent Office practically a National University of Science and Art, with millions of students. Its functions are those of a true university, to encourage study, to examine and certify results, irrespective of the age, sex, or nationality of the applicant; and its degrees are such as practical men covet.

Where our literary institutions graduate hundreds, our National University graduates thousands. Its degrees cover the widest possible range of merit, yet their worth is not exceeded by the degrees of Harvard or Yale. Notwithstanding the multitudes of unimportant patents issued, the multitude of patents which, for one cause or another, are never practically developed, the average value of a patent to the possessor and to the country at large is greater than the average value of a farm. We owe this enormous addition to national wealth, not so much to national genius for invention, as to the fact that inventions are encouraged by a liberal system of granting patents, and a spirit of great liberality in their interpretation by the courts.

The opinion prevails in some circles that the inventor, like the poet, is born, not made; that great inventions are, like great poems, the fruit of inspiration; and that the inventor needs none of the inducements and favorable conditions required for less creative work. Nothing could be wider from the truth. Invention is an art to be acquired by persistent effort, just as any other art is: the fact that men differ in natural capacity for such work no more proving the art unacquirable than similar diversity in capacity for other arts proves them to be altogether innate. And though many striking inventions have been made, like Goodyear's, through accident, and by men whose attention had never before been directed that way, still, as a rule, such accidents are few, and happen only to men on the watch for them, men so accustomed to regard all things as open to improvement that they are ready at all times to follow up the slightest clue to a new process or application.

To any writer who wishes to cultivate a new and profitable field, we could not suggest a more promising one than the interior history of inventions and inventors, to discover the process by which great inventions and great inventors have been developed. Their beginnings and failures would be peculiarly instructive. For of many a man, known to the world only as a successful inventor, the Patent Office has records of a slow development from weak and insignificant beginnings, often in an entirely different field from that wherein he has achieved his successes. Time after time he has come up to the great university for a degree, only—to use a bit of scholastic slang—to be plucked. Not unfrequently men begin so low even as to attempt a perpetual motion, in utter ignorance of all mechanical principles, and by study and experiments work themselves up to an honorable standing, sometimes becoming public benefactors of no mean order.

Where patents are less freely given, such developments are impossible. Heavy fees and unfavorable conditions discourage every effort; the poor man—and most inventors are poor to start with—cannot patent his invention if he makes one: without a patent it is useless to him; so, though he has the crude idea, or has the natural capacity for great inventions, he never makes any, and the world loses what might be of inestimable value.

A New Cause of Trichinae in Pork.

Some new cases of deaths, due to the eating of pork infested with *trichinae*, which are being quoted in Western journals, should be the means of directing public attention anew to the horrible disease of swine, called *trichinosis*, and to the fact that, when once the parasite attacks a human being, the result is prolonged suffering and, in a multiplicity of instances, death. The worm existing in the pork literally bores its way out of the stomach and into the muscles.

It has lately been found that swine may become infested with trichinae through eating carrion, or even decayed vegetable substances. This is a point worth consideration by farmers who incline to the belief that dead chickens, putrid swill, or any other filth about the place is legitimate food for the pig. The animal is not dainty in his tastes, and will lunch off his dead relatives with infinite gusto; but it is the poorest economy to permit him to assume the rôle of scavenger. No milk dealer will allow his cows to eat garlic if he can help it, though the brutes are crazily fond of the odoriferous weed; and there is certainly more reason for the farmer to see that his porkers have no access to unclean food. In the one case, if precaution be neglected, the taste of the milk is affected; in the other the entire flesh is rendered poisonous and dangerous food.

The Coming Cincinnati Exposition.

It will be seen, from an advertisement in another column, that the sixth Grand Industrial Exposition held in Cincinnati is to be open for the reception of goods on August 2 next. An important feature in this Fair is the thoroughness, accuracy, and honesty with which the tests of machinery are conducted, in contrast to the irregular and unreliable manner in which the same have been carried through of late in some other well known exhibitions. A large number of valuable prizes are offered, and excellent opportunities will be afforded for the exhibition of goods. Applications for space should be made at once. The Fair opens to the public on September 2, and closes October 9.